(No Model.)

4 Sheets—Sheet 1.

# J. R. MORGAN.

## OVERHEAD TRAVELING CRANE.

No. 488,716. Patented Dec. 27, 1892.

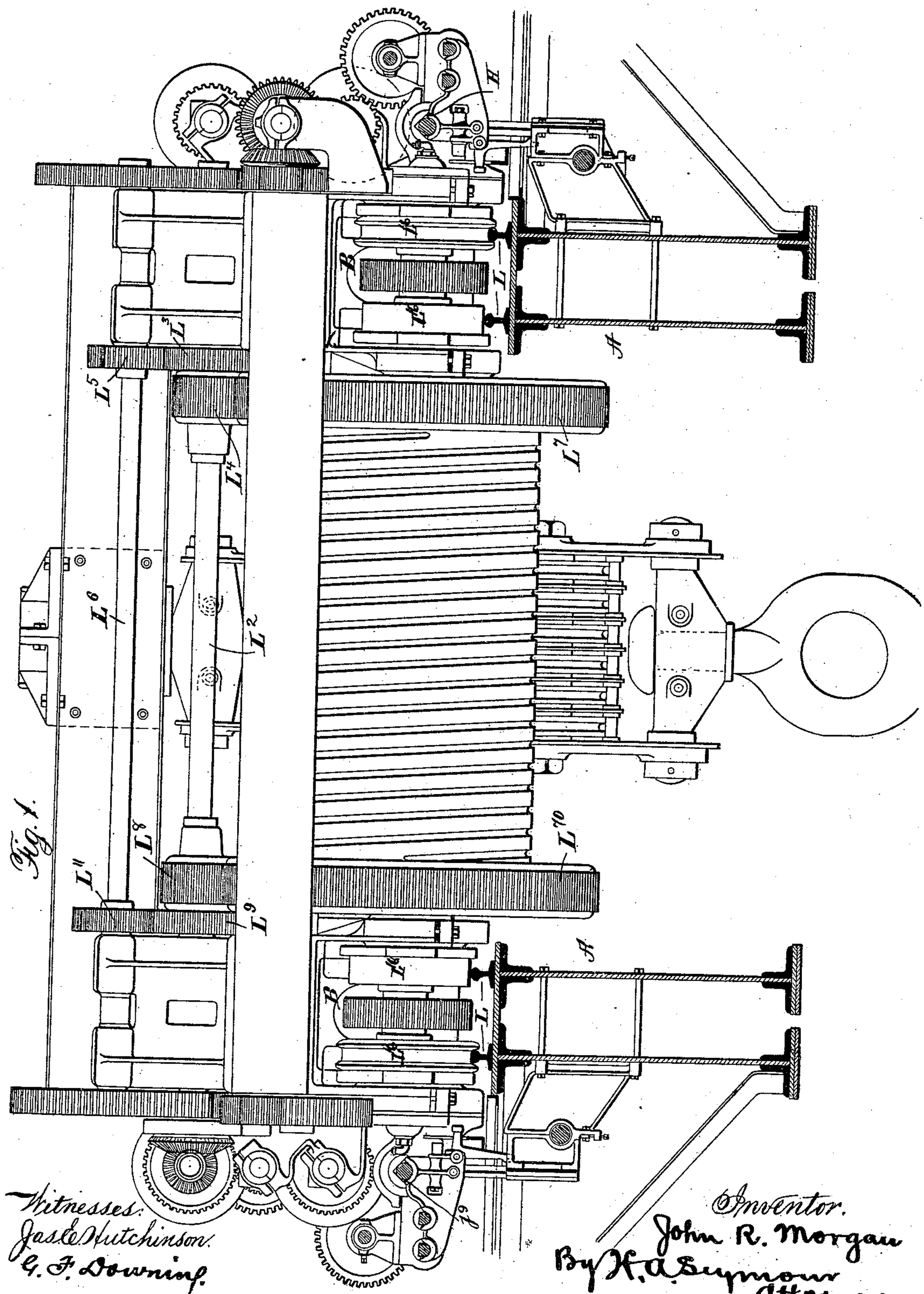


Fig. 1.

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G. F. Downing.

Inventor.
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(No Model.) 4 Sheets—Sheet 2.

# J. R. MORGAN.

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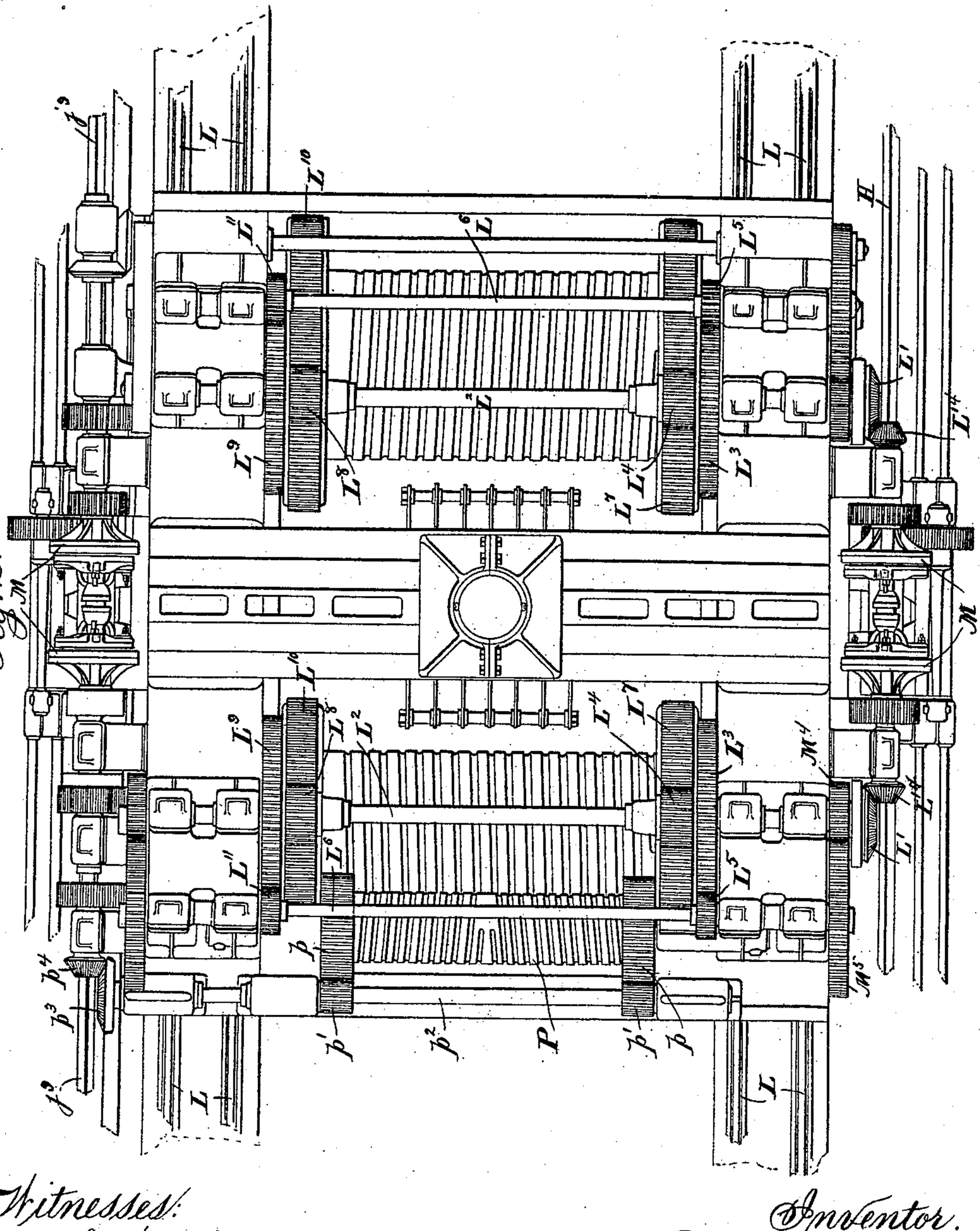


Fig. 2.

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4 Sheets—Sheet 3.

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## OVERHEAD TRAVELING CRANE.

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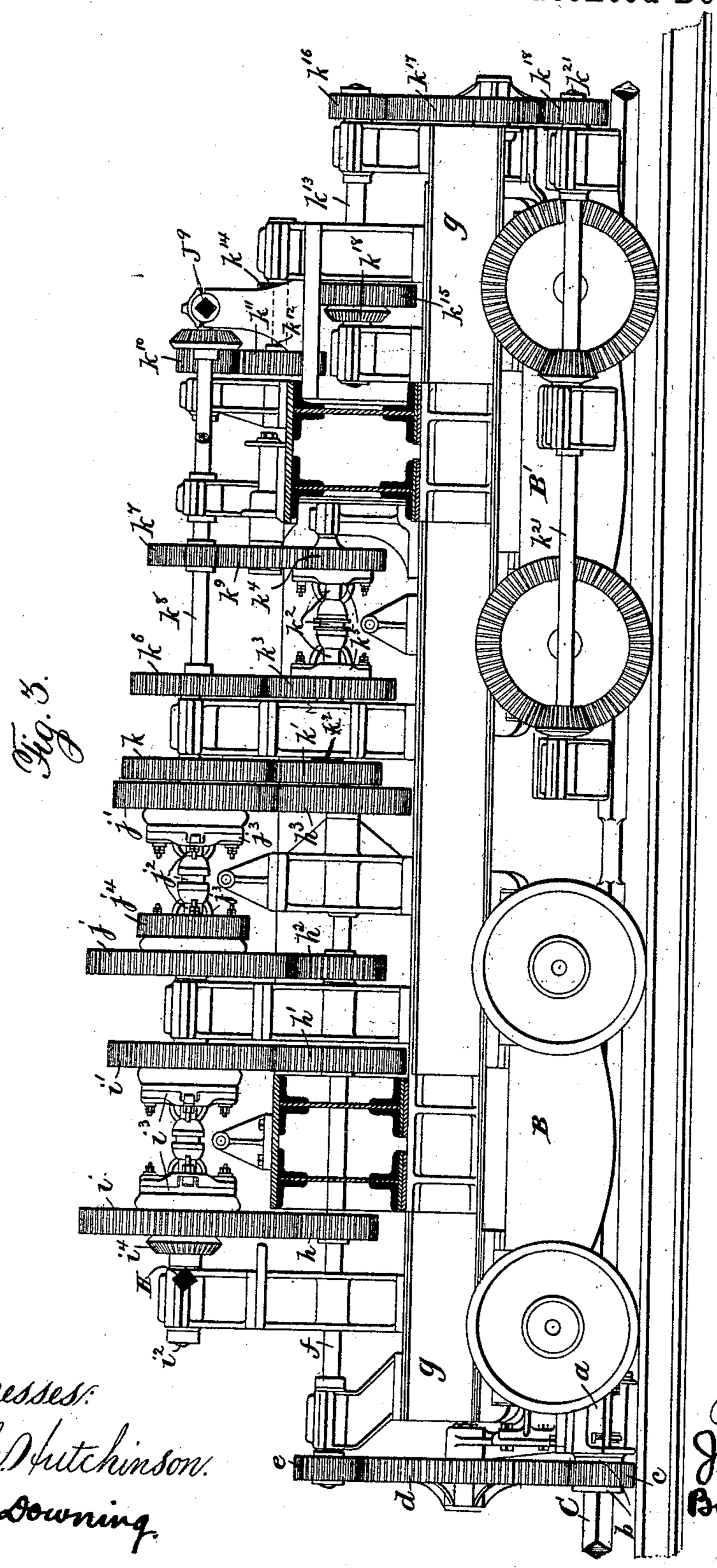

Fig. 3.

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4 Sheets—Sheet 4.

# J. R. MORGAN.

## OVERHEAD TRAVELING CRANE.

No. 488,716. Patented Dec. 27, 1892.

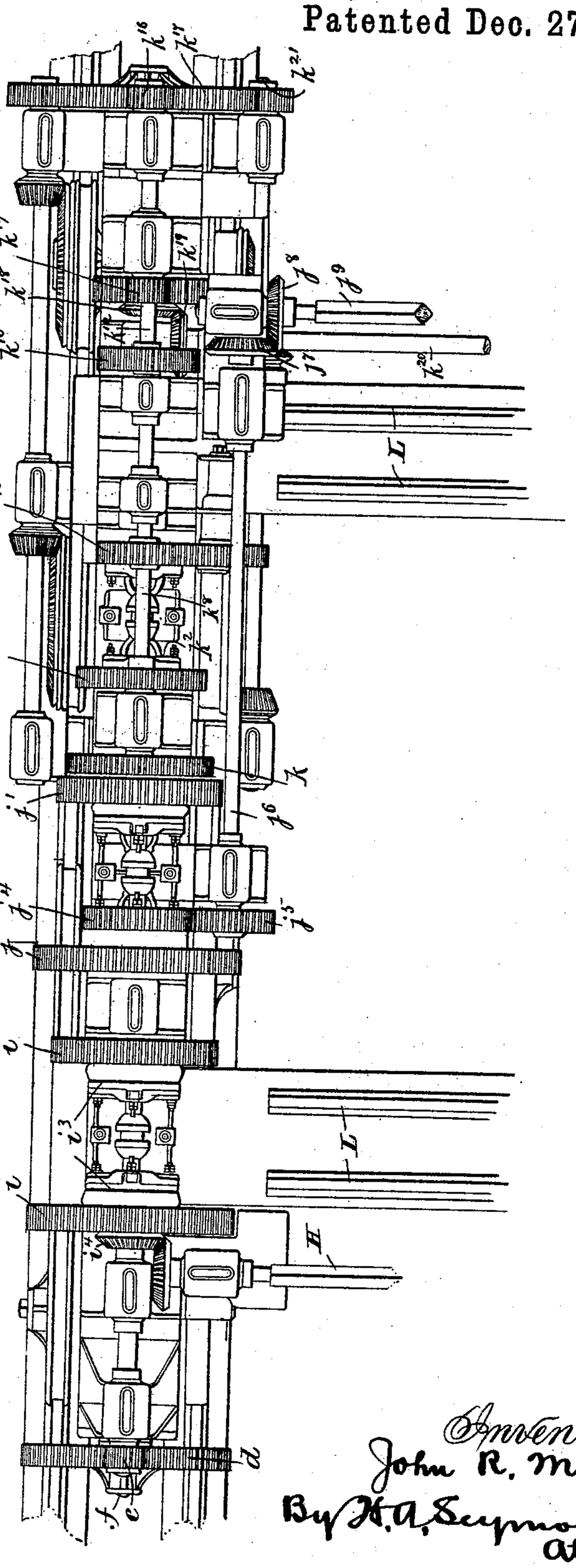


Fig. 4.

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# UNITED STATES PATENT OFFICE.

JOHN R. MORGAN, OF ALLIANCE, OHIO, ASSIGNOR OF THREE-FOURTHS TO THOMAS R. MORGAN, SR., THOMAS R. MORGAN, JR., AND WILLIAM H. MORGAN, OF SAME PLACE.

## OVERHEAD TRAVELING CRANE.

SPECIFICATION forming part of Letters Patent No. 488,716, dated December 27, 1892.

Application filed August 31, 1891. Serial No. 404,321. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN R. MORGAN, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Overhead Traveling Cranes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in overhead traveling cranes.

The cranes now generally employed for heavy work consist essentially of a bridge mounted at its ends on trucks, which latter run on elevated tracks, the bridge spanning the shop from side to side and adapted to be moved in the direction of the length of the shop, and a trolley mounted on trucks running on rails laid lengthwise the bridge, and adapted to move on said rails. The bridge is moved lengthwise the shop and the trolley longitudinally of the bridge by means of an angular shaft running parallel with the trackway supporting one end of the bridge, and by gearing connecting said angular shaft with the driving gearing on the bridge and the actuating gearing on the trolley. The invention disclosed in this specification relates to this class of cranes, and it consists in certain details in the construction and combinations of parts as will be more fully described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in end elevation of the trolley showing the bridge in transverse section, and Fig. 2 is a plan view of the trolley showing a portion of the bridge in elevation. Fig. 3 is a view in end elevation of one end of the bridge and Fig. 4 is a plan view of the same end of the bridge.

A represents an elevated trackway consisting essentially of two lines of rails laid parallel and adapted to support the trucks B, B′ carrying one end of the bridge. The opposite end of the bridge is mounted on similar trucks which latter run on a track way similar to the one above described. Located in a plane passing between the rails of one of the trackways, and suitably supported at intervals in movable bearings (not shown) is the angular shaft C which latter receives its motion from any suitable source of power. Depending from one of the trucks supporting the end of the bridge adjacent to the angular shaft C, is bearing *a* carrying a sleeve *b* which latter has a bore corresponding in cross section to the cross section of the shaft C. This construction permits the sleeve to move lengthwise on the shaft but prevents same from rotating independently of the shaft. Rigidly secured to the sleeve *b* is the spur wheel *c*, which latter transmits motion to the idle wheel *d* and the latter in turn imparts motion to the wheel *e*. Whenever shaft C is revolving wheel *c* is also revolving therewith and it is this wheel that imparts movement to the gearing which actuates the bridge, the trolley and the gearing on the trolley. Spur wheel *e* is rigidly secured to the main drive shaft *f* journaled in bearings on the end cradle or beam *g* of the bridge, and this shaft has thereon spur wheels $h$, $h'$, $h^2$ and $h^3$ all of which are rigidly secured to the shaft. The wheels $h$ and $h'$ engage respectively with the large and small spur wheel $i$, $i'$ loosely mounted on shaft $i^2$ but either capable of being locked thereto by the clutch $i^3$ which latter is the hoist speed clutch. Rigidly secured to shaft $i^2$ is bevel pinion $i^4$ which latter transmits the motion of shaft $i^2$ to the angular shaft H. This shaft H imparts motion to the gearing which actuates the winding drums on the trolley, and of course the speed of rotation of shaft H is dependent on the clutch and as the latter is actuated by devices in the operator's cage (not shown) depending from the bridge it follows that the speed of the main hoisting drums on the trolley can be changed or varied at pleasure.

The spur wheels $h^2$ and $h^3$ mesh with the large and smaller spur wheels $j$ $j'$ loose on shaft $j^2$ either of said wheels capable of being locked to said shaft $j^2$ by the clutch $j^3$. These wheels $j$ and $j'$ regulate speed of the auxiliary hoist and trolley and bridge, through gearing to be hereinafter described. The section of one of the clutches $j^3$ which is fast to shaft $j^2$ is pro-

vided with a spur wheel $j^4$ which latter meshes with spur wheel $j^5$ (see Fig. 4) rigidly secured on shaft $j^6$ journaled in suitable bearings on the bridge. This shaft is provided at its outer end with a bevel pinion $j^7$ which transmits motion to the pinion $j^8$ rigidly secured to the angular shaft $j^9$. This shaft runs parallel with the tracks on the bridge on which the trolley travels and engages a sleeve on the trolley similar to the sleeve $b$ on the bridge truck, which sleeve carries a toothed wheel which transmits motion to the gearing for actuating the trolley or in other words moves the trolley back and forth on the bridge. The trolley is provided with reversing mechanism by which the direction of travel is governed. The wheel $j^4$ is locked to the shaft $j^2$ but as the wheels $j$ and $j'$ are loose on said shaft, and receive their motion from the wheels $h^2$ and $h^3$ it follows that the speed of the shaft $j^2$ and consequently the shaft $j^9$ is dependent on the clutch.

Secured to shaft $j^2$ is a wheel $k$ meshing with wheel $k'$ on shaft $k^2$. This shaft $k^2$ is provided with two spur wheels $k^3$, $k^4$ loose thereon and connected to clutch $k^5$ whereby either of said wheels can be locked to the shaft $k^2$. The wheel $k^3$ meshes with wheel $k^6$ fast on shaft $k^8$, while wheel $k^4$ meshes with idler $k^9$ which latter imparts motion to wheel $k^7$. Thus it will be seen that by locking one wheel say $k^3$ to shaft $k^2$ the locked wheel imparts movement in one direction to shaft $k^8$ through wheel $k^6$, and by locking the other wheel $k^4$ motion in the opposite direction would be transmitted through wheels $k^9$ and $k^7$. The motion from shaft $k^8$ is transmitted through wheel $k^{10}$ and $k^{11}$ to shaft $k^{12}$ and from said shaft to shaft $k^{13}$ through wheels $k^{14}$, $k^{15}$. Shaft $k^{13}$ is provided on its outer end with a pinion $k^{16}$ which latter meshes with the large idler $k^{17}$ and the latter in turn drives wheels $k^{18}$ rigidly secured to the shaft $k^{21}$. The shafts $k^{21}$ are located on the opposite sides of one truck and each is provided with two bevel pinions meshing with larger bevel wheels secured to the outer faces of the track wheels. This arrangement of parts drives the wheels of one truck, but in order that both ends of the bridge may move at a uniform rate of speed it is essential to provide devices for actuating the wheels of the corresponding truck at the opposite end of the bridge. This is accomplished by the bevel pinion $k^{18}$ on shaft $k^{13}$ meshing with bevel pinion $k^{19}$ on shaft $k^{20}$ (see Fig. 4). This shaft extends to the opposite side of the bridge and there actuates gearing corresponding to the shaft $k^{13}$ and the wheels and shafts driven thereby.

By means of the gearing and clutches above described I secure the travel of the bridge and regulate the speed thereof, and also regulate the speed and direction of travel of the trolley on the bridge, and regulate the hoisting drums. The trolley which is represented in Figs. 1 and 2, is moved longitudinally on the tracks L L which latter are secured to the top surfaces of the bridge girders or beams. The trolley is provided on each side with wheels $L^{16}$ arranged in pairs as shown in Fig. 1 and the travel thereof from one end of the bridge is regulated by the angular shaft $j^9$ shown near the top of Fig. 2. The gearing which transmits motion from angular shaft $j^9$ to the track wheels of the trolley for moving the trolley back and forth on the bridge, are not essential to an understanding of the operation of the mechanism for actuating the hoisting drums carrried by the trolley, and as I make no claim in this specification to the special devices for moving the trolley on the bridge, I have not described nor minutely illustrated said parts.

The angular shaft H by means of a sleeve and pinion such as shown at $b$ and $c$ Fig. 3 for transmitting motion of the main angular shaft C to the gearing on the bridge, and also by a clutch mechanism shown at M Fig. 2, imparts motion to the bevel pinions $L^{14}$ which mesh with larger bevel wheels L′ fast on shaft $L^2$.

As the driving mechanism of both drums are alike a description of one will answer for both.

Loosely mounted on shaft $L^2$ is a large spur wheel $L^3$ and a smaller wheel $L^4$, the said wheels being secured together and meshing respectively with the wheel $L^5$ on shaft $L^6$, and the large spur wheel $L^7$ fast to the drum, the axis of the latter being in a plane with the axis of the track wheels of the trolley. The shaft $L^2$ is provided at a point near the opposite end of the drum with the small and large wheels $L^8$, $L^9$ also loose on the shaft the said wheels meshing respectively with the spur wheel $L^{12}$ rigid with the drum and the smaller spur wheel $L^{11}$, keyed to shaft $L^6$. As the wheels $L^3$ and $L^4$ and $L^8$ and $L^9$ are loose on the shaft $L^2$ it follows that with the parts thus described, a rotation of shaft $L^2$ would not rotate the drum. In order however to transmit the motion of the shaft to the winding drum, it becomes necessary to impart motion to shaft $L^6$. This is accomplished by means of the spur wheel $M^4$ keyed to shaft $L^2$ and spur wheel $M^5$ on shaft $L^6$. Thus it will be seen that when shaft $L^2$ is rotated the motion thereof is communicated to shaft $L^6$ and from the latter through small wheel $L^5$ to large wheel $L^3$ and from small wheel $L^4$ to the large wheel $L^7$ at one end of the drum, and from small wheel $L^{11}$ on shaft $L^6$ to large wheel $L^9$, and from small wheel $L^8$ (fast to wheel $L^9$) to the large wheel $L^{10}$ fast to the opposite end of the drum. By this arrangement of parts motion is communicated to both ends of the drum, by gearing subjected to little or no torsional strain and hence there is no binding or straining of the parts as there would be if motion were communicated the opposite ends of the drum by one long shaft having fixed wheels thereon.

The auxiliary hoisting drum P which is designed simply for elevating and conveying

light loads, is located near one end of the trolley near and partly over one hoisting drum. This drum like the other drums is geared up at both ends to small pinions $p$, $p'$ on shaft $p^2$. This shaft is provided at its outer end with a bevel pinion $p^3$ which latter is actuated by the pinion $p^4$ driven by the gearing which is actuated by the angular shaft $j^9$. As this auxiliary drum is simply intended for lifting and conveying light weights there is never sufficient strain on shaft $p^2$ to twist same and hence it is not necessary to provide against torsional strain to which the driving gearing of the larger drums are subjected.

I make no claim in this specification to a bridge mounted on trucks each having track wheels arranged in pairs as shown, and an angular shaft for transmitting motion to the movable parts on the bridge the said angular shaft being in a plane passing between the rails, as the same is claimed in application Serial No. 400,794 filed July 27, 1891.

It is evident that many slight changes might be resorted to in the relative arrangement of parts shown and described, without departing from the spirit of my invention, hence I would have it understood that I do not limit myself to the exact construction herein shown and described, but

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In an overhead traveling crane, the combination, with a track-way, a traveling bridge thereon, a traveling trolley on the bridge, of a main driving shaft carried by the bridge, and gearing on said trolley engaging toothed wheels connected with the track wheels for propelling the trolley on the bridge, devices for imparting motion to said driving shaft, and gearing and clutches carried by the bridge for actuating and changing the speed of the hoisting drums, for actuating and changing the speed of the trolley, and bridge, and for reversing the direction of movement of the bridge.

2. In an overhead traveling crane, in combination with the bridge thereof, a pair of four wheeled trucks supporting each end of the bridge on its own double railed track, one truck of each pair having its outer pair of wheels bevel geared for drivers, and driven by bevel pinions on one shaft, said pinion shafts on each driving truck being geared together across the bridge so as to operate synchronously and preserve parallelism of movement in the bridge substantially as shown and described.

3. The combination with a traveling bridge, and a movable trolley thereon, of a pair of main hoisting drums carried by the trolley and geared to move in unison, an auxiliary drum adapted to be rotated independently of the main hoisting drums and a chain carried by said auxiliary drum, the said auxiliary drum adapted to assist the main drums, to tilt ladles or other devices suspended from the main drums and to lift and carry comparatively light loads, substantially as set forth.

4. The combination with a traveling bridge, and a traveling trolley thereon, of a pair of main hoisting drums geared to move in unison, a hoisting chain connected to both drums, and an auxiliary drum actuated by gearing independent of the actuating gearing of the main drums, the said auxiliary drum adapted to carry light loads, and also to tilt ladles &c., suspended from the main drums, substantially as set forth.

5. The combination, with a traveling bridge and a traveling trolley, of a pair of main hoisting drums located on opposite sides of the center of the trolley and geared to move in unison, a chain connected to both of said drums, and an auxiliary drum located near one of said main drums but movable independently thereof, substantially as and for the purpose set forth.

6. The combination with a trolley and a hoisting drum thereon, and spur wheels at the opposite ends of said drum, of a driven shaft having two pairs of wheels, the wheels of each pair being secured together but loose on the shaft, one wheel of each pair engaging the spur wheels at the ends of the drum, a counter shaft driven by said driven shaft and gearing on said counter shaft for actuating the loose wheels on the driven shaft, substantially as set forth.

7. The combination, with a trolley and a drum thereon, the latter having a spur wheel at each end, of a driven shaft carrying a gear wheel keyed thereto, and two pairs of loose wheels, one wheel of each loose pair meshing with a spur wheel on the drum, and a counter shaft driven by the wheel fast to driven shaft and provided with two fixed wheels, each of which meshes with one wheel of each pair of loose wheels on the driven shaft, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN R. MORGAN.

Witnesses:
T. R. MORGAN, Sr.,
F. E. DRISSEL.